

Observation Platform for Dynamic Biomedical and Biotechnology Experiments using the ISS Light Microscopy Module, Phase II

Completed Technology Project (2011 - 2013)



Project Introduction

The objective of the research is the completion of an observation platform for the ISS Light Microscopy Module (LMM) as it currently resides on the U.S. Fluids Integration Rack (FIR). In its current configuration the LMM accommodates a Contained Bubble Experiment, and it has no substage illuminator and limited epi-illumination. There is a need for future use of the LMM in more versatile fluids and biological experiments. A modular observation platform consisting of an electronics module and the first two of an eventual suite of experiment modules is proposed. A life science experiment module that allows investigators to load up to two different fluids and combine them in a hollow glass slide under the LMM objective lenses has been designed and built. It is suitable for the imaging, enumeration and evaluation of biological cells in suspension or attached to the glass surface of the hollow slide for on-orbit, real-time image cytometry. Fluids can be changed to initiate a process, fix biological samples or retrieve suspended cells. The colloid science experiment module will be designed for conduct of certain microparticle and nanoparticle experiments for investigation of the colloid self-assembly (CSA) phenomenon, among others. The colloid science module is being developed in response to the high level of interest in such a facility. It includes a hollow glass slide and heating elements for the creation of a thermal gradient from one end of the slide to the other. The life science and colloid science experiment modules mount atop the electronics module in the position on the LMM where the stage would be. The electronics module that contains a diffuse illuminator, power supplies for two piezo pumps, controller boards for pumps, valves and illuminator The electronics module is designed to receive power and control signals from the FIR/LMM system. The same electronics module will support the life science and colloid science experiment modules.



Observation Platform for Dynamic Biomedical and Biotechnology Experiments using the ISS Light Microscopy Module, Phase II

Table of Contents

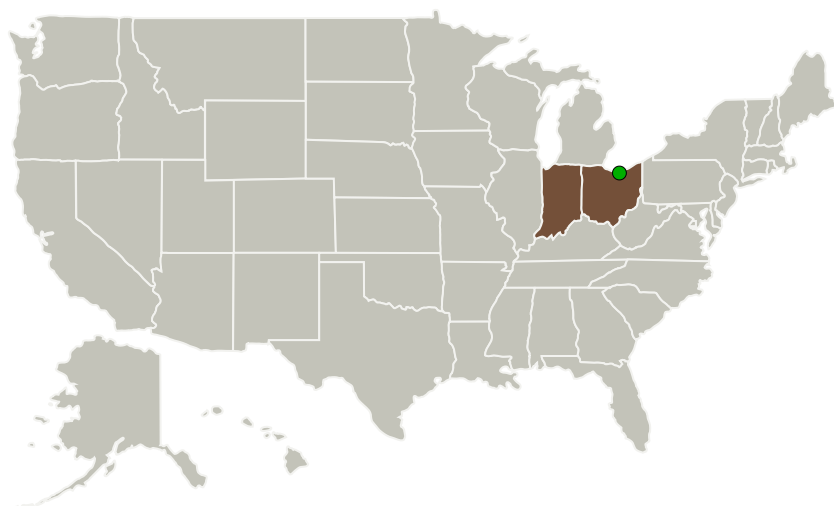
Project Introduction	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

Observation Platform for Dynamic Biomedical and Biotechnology Experiments using the ISS Light Microscopy Module, Phase II

Completed Technology Project (2011 - 2013)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Techshot, Inc.	Lead Organization	Industry	Greenville, Indiana
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Indiana	Ohio
---------	------

Project Transitions

June 2011: Project Start

June 2013: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139192>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Techshot, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

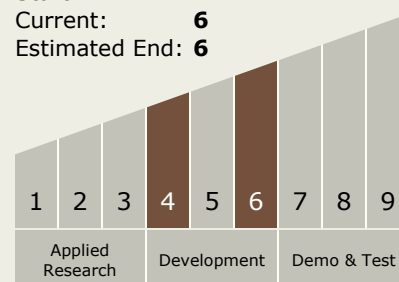
Carlos Torrez

Principal Investigator:

Paul Todd

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Observation Platform for Dynamic Biomedical and Biotechnology Experiments using the ISS Light Microscopy Module, Phase II

Completed Technology Project (2011 - 2013)



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.3 Human Health and Performance
 - └ TX06.3.1 Medical Diagnosis and Prognosis

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System